31304/LTR/V155

ELECTRONIC PROGRAM GUIDE FEATURES

This application discloses the subject matter of technical meetings held at VideoGuide Inc., in Bedford, MA.

Day One 7/16/97
Tape #1, Side A
Doug, Tom Ward, and Ken Hancock:

Alot of VG technology is going into GUIDE PLUS+ (GP). Next generation of GP will be delivered to OEM's in Oct. 97.

Tom Ward, product marketing, working on video interface (UI) from point of view of the customer. Four areas: hardware, firmware, UI, and information broadcast (IB).

UI comprises remote and the screen.

67

Remote: Joy stick is a substitute for circle of 4 arrow keys and a select key in the center. Joy stick is high cost but is user friendly because user does not have to look at the remote once the finger is in contact with the joy stick. Buttons, such as color (action) buttons, have multiple functionality depending upon the mode. It is context specific. The labels on the screen describe the function in the current mode. Record "regularly" has a different meaning because we are locking onto title--record this title on this channel at this time slot any day of the week that the program is telecast. Regularly has a different meaning depending on the telecast schedule of the program. If a telecast is preempted by another program, the new program is not recorded because it has a different title. A "not recorded" message is displayed on the screen. New feature: record list

has the titles that would fit on the tape at fast tape speed in one color, and titles that would fit on the screen ast slow speed in another color. The detail window also appears in the record list to assist in amending the list. Conflict resolution: prompt to propose a solution--if one occurrance program and a regular program conflict, the prompt would suggest selecting the one occurrance program; there is also the option of turning off the regularly recorded program temporarily. There are warnings and conflicts; the machine will not let you put conflicts on the record list. Program currently being recorded is indicated on the guide by a different color tile.

251

Cursor movement:Display 7 channels at a time in the guide. While scrolling, the titles are not drawn until the scrolling stops. This speeds up the processing and makes the screen appearance less confusing. Titles are truncated. In the top level screen you can jump directly to a future day. While scrolling the cursor will not highlight the top or bottom tile on the screen unless it is at the top or bottm of the lineup. This is how th user can tell that there are more channels. Shows are color coded to indicate genre. By highlighting a program in the guide, the user can call up a list of all occurrances of that program for the week (this may be a good idea but is not in the equipment and was not suggested). There is an alphabetical list of all the programs for the week; a program can be marked from the list for viewing or recording.

393

Proposal to skip one time of recording and then automatically turn back on. Find a way to select among programs regularly recorded to weed out reruns. If reruns or repeats are marked, this could be done. Another proposal to automatically update

recording list to reflect changes in program scheduling. It seems to me this could be done by tracking title. Proposal: turn off items on the record list when you go on vacation; maybe indicate the turned off programs but leave them on the list so they can be turned back on.

443

New feature: watch list. Automatic turns on tv at the selected time. Same functionality as the record function.

470

New UI screen cuts out one half hour of grid and replaces it with 3 windows. PIP occupies 1/9 of screen. Initally, when entering the guide from the tv mode, the PIP window is highlighted but no show is highlighted in the guide. PIP highlighting may be a border change of color--not yet decided. With PIP highlighted, a program is recorded by pressing the record key of the remote. By locking PIP you can see what is on without leaving the channel you were watching. If you then unlock the PIP, the highlighted program appears in the PIP. Query: what is in the detail box when you first enter the guide and the PIP is highlighted? You can also highlight the ad windows; when this happens more text about the product is displayed.

Tape #1, Side B

If the ad window is a product, pressing a record button will record an infommercial run at a future time. With a back link this window could be interactive--count the number of times the window is highlighted or ask consumer questions. Or it could display a video clip of the product being advertised. After highlighting an ad window for a future tv program, pressing record or watch will carry out the designated function. Virtual channel ad slot doubles the program exposure in the guide. It

acts like a channel--user can record and watch and get info from info box.

Query: is there any special handware dictated by the new 3 window Pegasus format.

Be sure that filtering and interactivity of the windows are fully covered.

62

Filtering: computer monitors users viewing habits and creates a profile--what and when the user does; like a Nielson box; what the user watches, when he changes channels; what ads he watches. One way: taylor an ad to a customer based on viewing habits--e.g. a golf ad to a viewer who watches gold programs. Query: does this mean that we are tagging different ads in the window for different viewers based on profile? Also the guide can be ordered based on user profile to make it easier to navigate. Each user could have their own PIN or individualized remotes.

126

Parental control: Parent selects the programs the viewer can watch from the guide--marking the programs to be blocked. Then the child will also see a customized guide containing only the unblocked programs. This is not only a form of parental control but it also simplifies the guide that is displayed to a child.

Filtering: the individual profiles include the times of day the person watches tv, the duration (attention span), level of surfing, what ads he watches rather than switches away from. Filtering can help select movies the viewer is likely to want to see based on past choices. The virtual channel selection could

be individualized based on user profiles. Personal picks. There could be a special screen for suggested viewing "whats hot tonight" based on the profile.

226
Navigation bar: to get to theme display scroll up above the top of the grid; there is apparently a page up key; as a power feature there could be a "menu" key to go to the top the grid guide.

Other critiria to filter on are zip code, which services the view subscribes to; how long have they subscribed; type of tv; age of tv; where the tv was purchased; what viewer is watching now, the top channels; type of programs; time slots;

FILTERING IS IMPORTANT TO TARGET ADVERTISING TO THE VIEWER'S INTERESTS

266
End of transcription

Tape #2, Side A
When the viewer swithces channels when an ad comes on that is valuable info for the profile.

Another idea is to switch ads while the viewer is watching tv based on the profile. There could be different channels of ads. The ad to each viewer is selected based on profile.

27
Without the network's authorization, a service could monitor the ads and send a switch channel command in the VBI when an ad is telecast; an ad telecast on another channel is substituted for

the network ad based on viewer profile. An option is to let the viewer decide whether to auto surf or get another ad.

54

Substitutes for two way transmission: as a substitute, display an offer screen telling the viewer to call an 800 number and read off an encrypted number having a check sum on the screen to get a gift certificate. Since the offer only goes to those watching a particular program, significant results can be achieved from an on screen survey. The on screen offer or query is in effect the filter. Profile can be used for surveying, customizing the guide, and targeting advertising.

100

Notification on screen to alert the viewer of an event is in VG: an on screen notice in the tv mode that a program will be recorded in 2 minutes with a query of whether to switch the cable box to record the program. If the answer is "no", the program is deleted from the record list. There are all sorts of other possibilities for on screen notifiications.

When you turn the guide on, a full screen ad could appear first like one of the window ads in the guide. You could record an infommercial from it.

When a mfger wants to sell an extended warranty, a screen could be timed from the initials purchase or turn on date to remind the viewer of the opportunity, e.g., 11 months after purchase. Or the message could be sent down the vbi if the terminal equipment is separately addressible. You could also target the price point to the user profile and the ability to pay.

145

One way e-mail without a pc: e-mail delivered to the head end by the sender can be sent out to separately addressible user terminals. Until 2 way transmission is available, a 900 number could be used as a back link.

200

Watch list: has power in giving a benefit to the consumer. There could be a watch channel at turn on. Rather than having the last channel watched come up the next time the tv is turned on, a selected channle could be turned on. A broadcaster could send out an onscreen query to enter a command if the viewer wants the broadcaster's channel come up when the tv is turned on. This is an powerful option because a broadcaster would want the viewer to start with their channel. Barker concept is different in that the viewer or the viewer profile, rather than the cable channel decides.

274

Explain further the idea of a regular watch of a program by an enticing ad. It seems that if the viewer selects a program by highlighting an ad window, the program goes on the watch list. Would the viewer be asked by the ad window if he wants to watch the program regularly or by an entry on the watch list? It seems like the former. The regularly could time out if the advertiser stopped running the ad or to ensure that the advertiser runs the ad often so the viewer renews an interest. An entire linup of programs or a series telecast over a period of time could be solicited by an ad window instead of only one program.

Watch advertising has complete parallels in record advertising.

Linking from record and watch to sports and news guides is covered in VG appl and is important. In the sports guide, which is a sports scoreboard, there is an icon indicating that the game is being broadcast. So the viewer can record or watch the game by clicking on the icon or entering another input command. Also there can be an icon in the grid guide to indicate that there is more info, e.g., a score displayed in the sports guide. (This probably is not disclosed in the VG appl.) The viewer could click on the future game in the grid guide to find out in the sports guide more info e.g. the odds about the game. This should also be applicable to the news guide.

Tape #2, Side B

In other words a data service can be linked into the guide--it can go either direction--from guide to service or from service to guide. You can also link one data service to another. E.g. from a data report on astronauts, the viewer could be linked to a tv news report on the astronauts. Or from a tv news report the viewer could be linked to data about the subject. The tv report can be recorded for use to supplement the data service report. Recorded tv news program can be indexed by linking to a news data service or a newspaper. By clicking on the latter, the viewer can see portions of a recorded tv show. This principle goes across services--e.g. it could be sports content. The viewer can see recorded content either selected from an index or based on his profile. A PLUS CODE like address could be entered to link to the program. Or the recorded tv program could be displayed in a PIP while the data is displayed on the rest of the screen.

93

StarSight found that most viewers are looking at the now guide. Thus the 2 current half hour slots seem to be most important.

121

Pegasus will probably have a next (channel) guide. Press the info key to invoke the channel guide (check this out--I do not understand.) But the horizontal scroll of the grid guide could function as a channel guide.

144

Navigation: When you navigate cursor from the PIP window to the guide, the cursor starts on the tile at the top of the lineup, ABC. In the guide, to go to an ad window you scroll left to the PIP window and then down to the desired ad window. To highlight the navigation bar scroll up to the top of the lineup and from there up one to the navigation bar. There are various destinations listed across the screen; info center, sports, news, set up, help, etc. There will probably be 3 or 5 destinations. Initially the middle destination will probably be highlighted.

Pegasus has 2 days of programming instead of 7 days.

There are 2 ways to return to tv mode: press the "guide" key to return to the program (channel) you were watching last in the tv mode or press "select" to go to the program highlighted in the guide. Press the menu key (optional) to go to the top of the guide.

367

You can use the preexisting "last channel" key in the guide to return to the program you were watching before entering the guide mode or the last program on which the PIP was locked.

Ways to jump in the guide are important. One way is to enter the cable channel number into the number keypad; then the cursor jumps to the position in the guide where this channel is located.

(Consider a brain storming session on jumping and filtering; another way may be to use bookmarks; if a way can be found to key in letters, another way to jump could be to key in the station name, eg. CNN.)

Tape #3, Side A
Jon Sutton and Ron Alexander

Bootstrap patch to improve the reception characteristics of the box. VG stored patch level, i.e. the latest revision received. A newly installed box has received no patches. By keeping a record of the patch level, it can be determined which patches to install in each box. Only boxes that had a patch level of zero, would receive the bootstrap patch and then the box would have a patch level of one. As further patches are received, they are installed in all boxes that have a lower patch level. A patch is sent out more than once, but it is only installed once.

19
Doug discussed disclosure of VG appl.

36
Transmission of guide data: in the future Pegasus download scheduler could designate where to find further guide data, e.g. go to a specific satellite channel at a specific time to download DSS listings or to ESPN at a specific time to download sports listings or to CNN to download news listings. All of this would be controlled by the Gemstar data feed. Thus the data feed tells what it is, and when and where it can be found. The viewer would

only get this specialized guide data if it is of interest. As more data becomes available, such an index in the Gemstar data feed to command the particular box where and when to go to find the data it needs will become more necessity. The box will piece together the data it needs. It will also find an alternative channel that is transmitting the data if the primary source fails. Review Brian Klosterman's patent on 2 different data sources. Is it new to have an index of the sources on one channel.

(Data feed indexing to other channels appears to be important--get more input.)

120
PCTV applications: combine with sources from the internet; could be interactive in that the viewer asks for the info. Chat room sessions could be listed in the guide. URL.

Record last 4 hours of CNN news on recordable DVD. A index is displayed on guide. This gives the viewer random access to all 4 hours of video.

219
Consider navigation into an infinite bandwidth system.

252
Consider infinite computing power--no limitatiions on searching.

280
Next generation DSS will have an agent feature--ask the viewer what he likes and then present announcements of programs meeting the criteria.

350

Search engine: with a back link you can take the profile developed for the viewer and turn it into a query to a database of programming located at a central computer, i.e. off site, which is must larger than is practical at the viewer's terminal. Then take the expanded data on the program of interest to built a larger query about what the viewer would be interested in.

Tape #3, Side B

Search on the internet for programs meeting certain program criteria and download the program info, title, channel, and time to a watch or record list. Thus the data base is infinite.

Send the program id's of everything that the user watches to a central computer to corralate the datat and develope a user profile. The central computer generates a query that is reduced to program ids at the user terminal and sent to the central computer. All the processing and memory are at the central computer. Build a profile from program ids at the user terminal and analyze this data at the central computer. This results of the analysis are sent back to the user to assist in deciding what to watch or record, e.g. by adding to a watch or record list.

The watching pattern of the tv viewer is fed to the search engine on the web. It comes back to the viewer simply as tv program ids meeting the viewer profile. This is different from a direct connection to a central computer as described in the last paragraph.

100

Find common threads between programs that a user watches to help develope a profile for watching.

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Problem: how do you automatically (without an editorial staff) choose stores from multiple news feed for display in a news service? Even if you use automation to reduce the amount of editing necessary, that is helpful when you consider the vast volume of news available. The objective is to develope a simple algorithm that is applicable to all types of data--even tho much processing is necessary. Analyze groups of things (e.g. news stories) to find things that are similar so you can learn the interests of a user and deliver content that meets these interests. The delivered news can be customized in the same way as the tv programs the user wants to watch. The criteria to be applied to the algorithm are sent by the user to a central computer for selection of the news item to be sent to the user. Or the analysis can result in the posting of a web site on the users display where more info is available.

308

VG channel map selection by zip code. All channel maps in the zip code are downloaded. There is a display telling the user "if you have Colonial Cable and get HBO on channel 43 pick this one". It is left up to the customer to decide which channel map to select. In the new system, the tv selects the correct channel map; in some cases the user must decide from a channel map selection matrix.
Tape #4, Side A Tom Westberg

180

Re: switching into the program watched by tv viewer on his receiver commercials telecast on different channels. The ability to develope a profile and use the profile to select one from a number of sources of advertisements to be targeted to the individual viewers (preferrably by seamless switching) based on the profile. Narrowcast commercials based on the profile.

Monitor the particular commercials viewed by each viewer. Ads are worth more if you can measure the cpm.

206
A way to monitor what viewers are watching is to send a prompt along with the tv program to a sample of viewere, i.e., 1 in a 100, announcing that they get an incentive, $100 gift certificate or purchase credit for calling an on screen phone number and reading into the phone a number that idendifies the ad from the bottom of the screen.

(A hot area is monitoring programs or ads with and without a backlink.)

235
Discussion of a PCS backlink.

327
Customizing an overlay message to an ad on a local basis: your box knows where the individual viewer is geographically. The broadcaster can packet match on the zip code to customize the message so each zip code gets a different message, i.e., the 3 Burger Kings in your local. The bulk info is preloaded into the boxes which chose based on zip code. (Is the bulk info the messages for all the upcoming ads for the next day?) The preloaded messages can be transmitted by a Gemstar host during off hours and stored in the user terminal for use when the ad runs during the tv program. The electronic trigger to run the message comes along with the tv signal in real time. The trigger can accompany programs on non-Gemstar host channels and identify messages stored in the user terminal. DSP=digital signal processor.

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Should we explore patentable ways to embed info or data into a digital video signal? Tom said Adobe has a way to put a digital watermark into a digital photo; could the application of this principle to tv signals be patentable? (445)

533

Filtering: geographic or viewer interest filters. It is difficult to find the axes to correlate on. One basis for correlating used by Amazon Books: survey likes of readers so it can be said, if you liked book A, based on the experience of other readers, you will probably also like book B.

Tape #4, Side B

Tom thinks human intervention is probably necessary to make a meaningful correlation. Correlate on time or type of proram.

Most of the ads will be for other tv programs because that is the most effective type of ad in the guide. Also the program ad can be put on the record or watch list so it will not be missed. (Assess whether a future program ad linked to TDCL so it is capable of recording or watching displayed in a guide of current programs is novel--it seems quite important.) The disclosure of the provisional application filed on July 21, 1997, entitled "EPG WITH ADVERTISING MESSAGES", is incorporated fully herein by reference. Tile 52 in that application shows an example of an ad for another tv program--it is a program listing that is out of place channel wise and time wise in grid guide 22. That is, it does not appear in the usual channel position or time position in the guide, but the tile is otherwise like the other program listing tiles of grid guide 22 (including height), except that it occupies the entire width of the tile irrespective of the duration of the program. When a program listing is in the usual

channel position, the tile scrolls off the screen as the up and down arrow keys are pressed. In contrast, tile 52 remains on the screen at all times as the up and down arrow keys are pressed, so the ad remains in view at all times.

099 end of tape

Day Two 7/17/97
Tape #5, Side A
Steve Dias, Chris Schoaff, and Ken Hancock:

Firmware: VG firmware was written entirely in C in assembly for a 68000 processor. It has a preemptive multitasking operating system, where there are timer interrupts from the hardware to do time slicing of various processes. Some of the high level processes that have CPU priority over the other processes are UI processes such as scrolling, intermediate level processes are for data collection, and the lower level processes, e.g., garbage collection and memory management, would run all the time when not preempted.

055
Memory management: 512 K of RAM--split into 2 blocks. 256 K was referred to as valid memory--memory used for temporary tasks and bit maps. If something went wrong with the box we didn't mind throwing it out and initializing that part of the memory. The other 256K is called mallic memory--this is data bases, news stores, titles and descriptions, program channels and times stored in a way to minimize the memory space required and the search effort. A data base manager tries to use as few blocks as possible by grouping together different pieces of info. E.g. each title has an id; all id's that are close to each other are

grouped in a single block so they can be searched more easily. This gives faster data base look up.

Cooperative heap compression: when many different sized blocks are kept for different periods of time, memory fragmentation occurs. When other processes are not running, the data base manager is continually moving the blocks downward and together in memory so the data is being stored more contiguously. This results in efficient memory utilization.

108

UI: UI commands are received from the remote. To change channels commands are sent from the remote to the box and from the box to the tv. To prevent interference between the channel changing commands, ... (not completed). In the firmware each screen has a different table. A central area receives the remote command and routes it to the proper table depending upon which screen is being displayed. The software to execute the command is read from the table.

Smooth Scrolling: When the cursor reaches the second tile from the bottom, and a new tile appears on the bottom, the entire tile and its contents e.g. title grows gradually in height until it is the full height and the tile that is disappearing from the top of the screen shrinks in height until the tile is gone. This provides a smooth transition in the overall screen display but is not actually perceptible because it is changing at 1/60 of a sec. Scrolling is less disorienting to the viewer than a page by page screen change, which is what S/S uses. The entire bit map does not need to be redrawn as you scroll up one tile--only the top tile is shrunk or compressed in the vertical dimension. While slowly scrolling, the new title appearing on the screen is not redrawn until the scroll stops. While rapidly scrolling

multiple tiles, the processor stops redrawing the title on any of the tiles during the scroll; the processor waits until the scroll stops or slows down to redraw the titles. This permits faster scrolling because the titles do not have to be retrieved until the screen reaches the desired point. This applies to both vertical and horizontal scrolling. The user can remain oriented because the channel ids and times remain displayed.

233

Description in detail of tile shrinkage during scrolling. Maybe more attention should be given to this feature. When you change the screen you want to leave as much data as possible so you minimize the amount of data that needs to be redrawn. Redrawing the data is very processor intensive. (It seems to involve a special interaction between the firmware and the hardware to minimize redrawing the bit map and retrieving data from memory.)

Pegasus works the same way.

285

Catinated Titles: We transmit and store the entire title because it is displayed in the BYB (big yellow box). It is catinated on the fly for display in the tiles. The catinated title is displayed with elipses. There are rules for shortening the title.

395

Storage and retrieval of epg data base: As in TV GUIDE PLUS+ the data is stored in SIPs; a time-channel array in memory stores pointers to the SIPs. The grid guide data for 48 hours and the theme data for 8 days are downloaded to the user terminals. What is different is how the themes are handled. Instead of theme lists, the array has an eight day capacity. For the first 48

hours there are pointer entries in every array cell. But after 48 hours, there are only pointers for the SIPs that have themes. Thus, the array is much sparser after 48 hours. The programs that do not have themes are deleted from all the SIPs after the first 48 hours.

The grid guide is composed in the same way. But the theme guide is composed by inspecting the theme field of each SIP. This is easy after 48 hours because you can scan the array for pointers and only inspect the SIPs that have pointers in the array.

438

The array wraps around? The location of each day in the array changes--i.e. day one varies from array location to location. Get more detail about this.

467

The theme fields of the SIPs are organized so the processor can read the themes very quickly by scanning the SIPs. There are 16 bit theme fields at the beginning of the SIPs. (When a SIP is received I believe the 16 bit field is created so the SIP can be inspected quickly; in other words it is like a table created to facilitate theme recognition. Maybe all the themes are stored in the first field in the SIP or at least a flag to tell the processor to look at all the programs in the SIP.) Get more detail about how the processor is able to scan the SIPs so fast.

Tape #5, Side B

UI is the only thing that is considered by the public in determining whether an EPG is better. Design objective is to put most of the control on the guide end rather than the OEM's end.

The new product will support a track ball (with on screen arrow) interface for the Zenith guide. The current version of the guide in design for the Pegasus chip is called bronze. (It will replace the Sanyo chip.) This should look like the present Gemstar version of TV GUIDE PLUS+. The next version is Pegasus 98. There are 4 or 5 IC2 commands added by the use of a track ball. There is already a track ball interface with the S/S guide.

67

In VG the sports scores are compacted so the entire game results can be displayed with relatively little data storage. There is the ability to record a sports event by clicking on the box score in the sports guide without having to go to the program guide. Smart sorting: If a program is on two channels, the system will select the best channel based on which of the 2 is watched more often. A info braodcast packet sent with the scores orders the score in the sports guide depending upon locale. E.g., in Boston the Red Sox games are first.

The display is color coded depending upon the stage of the game, i.e., game in progress green, final score blue. As of now Pegasus does not have a sports service. If the game is in progress, you can move from the box score to the game on tv. Pegasus will probably start having a news service in late 98 or 99. (Consult the VG people re the scope of protection in the pending appl on subscription data service.)

VGII, which was never completed, would have had links between news items in the news guide and tv programs. A click on news item in the news guide permits the viewer to record or watch a tv program that reports on the same event. Pegasus could be designed so the tv news program appears in the PIP so the viewer

can read the story in the news guide while watching a tv new program that reports on the event. The same thing applies to the sports guide.

194

Packet matching: VG matches ids on transmitted packets of operating code changes or info with characteristics of user terminals such as zip code and equipment type. The match could involve an logical AND or OR function.

EPG info adjustment not actually implemented: if a sports event is running over, send down the VBI a packet to update the time of the programs scheduled to be telecast after the sports event. This will update the recording list to permit the program to be recorded.

254

P-code interpreter in new Pegasus: A virtual processor operates on top of the real V-8 processor. I.e., there is a microprocessor and a P-code machine that runs on top the of microprocessor, both in an ASIC. It gives you a higher level language to program in without a compiler. It uses P-code. It shrinks the code size. Much larger patches for example would have to be sent out than by sending P-code. Is easier to debug. You can program faster. It is an easier and more reliable to code on a less expensive part. The actual code requires less space so you can use a smaller ROM. The processor can operate more quickly because the P-code machine which is the piece of the firmware that reads the P-code commands and executes them with the V-8 (?) instructions and the microprocessor are both actually on the ASIC itself. So the processor does not have to go out the ROM as much to execute instructions. It just has to go out to fetch a P-code instruction and then it executes all the rest of the commands internally.

300

Colors: We load a color table which defines the colors for each row or band. So each band can have its own set of 16 colors. But different sets of 16 colors can be loaded in each cell. 8 bit tiles give 256 colors. To change a highlight, you only need to change the applicable bite of color in the color table and the whole band changes. You do not have to redraw everything. (Get more clarification of this feature.)

334

Translucency in the PIP window: alternate each pixel--one pixel is the color of the overlay and the next pixel is transparent.

350

Guide without PIP window: The tv program is on the screen full frame and the guide is overlaid on the bottom 2/3 of the screen as a translucency.

385

Different types of graphic objects can be sent in a packet with or without text. Packet format permits text and graphics to be sent together in a single packet. This is primarily intended for ads. The is documentation for this.

405

In Pegasus 98 instead of multitasking, the processor operation in event driven. The events are put in a que to be executed. There are a few interrupt functions that operate outside of the cue framework. The events are assigned a priority. The idle processes will never execute when higher priority events are in

the cue. But the higher priority events are the remote commands and data downloads. There is a lot of deadtime between these events. This requires a smaller operating system so less space is required to store code.

468
Pegasus 97 (bronze) is scheduled to be delivered to the OEMs in September.

480
Notifications: When you are watching a tv show and it is time to record a show on another channel, a notice appears of the screen. "Press one button to change channels and press another button to cancel the record reservation." Notices can be transmitted with the tv signal to display to selected viewers.

525
Pegasus user interface table: a mfg id is sent over I2C to processor; look up in a firmware table how each screen should look for that mfg. The guide is customized to each mfg. The table entries can be upgraded by sending a patch packet. It also applies to screen colors and on screen messages. In the future it would be desirable to have the mfg pass an entire customization structure to the guide. (May be important feature.) There is a spec for this feature.

Tape #6, Side A
Art Ng and Sean O'Neil:

Screen manager: This works the same generally as VG. Patches and a jump table are used to patch in new firmware to replace or modify the firmware in ROM. The patch sent down the VBI could theoretically completely replace the firmware resident in ROM.

Or there could be only a boot strap ROM to receive the code and all the code could be sent down the vbi. That is the way we plan to do subscription services. The functionality to enable the viewer to receive and display news services will all be sent as a patch. The processor will jump into the new data service screen instead of the guide even though data service firmware is not built into the system as installed. (How are the patches verified?)

027

New idea: Have a vbi line dedicated to one type of data--e.g., the ESPN vbi would carry the sports data service only. Since ESPN does not cover all households, its vbi line is not that valuable and a better deal can be struck with them to use their vbi. As an incentive to carry this data, the data service would display the ESPN TV program in the PIP window. Since the tuner must be set to ESPN to capture the data, the tv signal is available for display in the PIP. (Doug mentioned 8 vbi lines--explain)

090

To date all guides require the system to be off to download guide data. We have 3 approaches to download data with the system on. First, if you have 2 tuners, the second tuner can be used to download data while the other tuner is receiving the tv program being watched. Second, if you are tuned to the right channel while watching tv, you can also download data at the same time. In the case of digital tv, this possibility increases because more than 1 channel is telecast on a single carrier. Third, is the above ESPN senario in which we can download alot of data--a fast carousel. This becomes almost a real time data feed. If you have 2 tuners you could be downloading on the fast carousel and the slower carousel of a host.

070

Customization to individual mfg: currently the customization data and mfg ids are stored in ROM or sent to the guide later by patch matching--screen colors, fonts, new graph objects, string data bases, naviation scheme. The tv sends the mfg id as an I2C command to the guide. Later we may want the tv mfg to send the guide an entire customization record as an I2C command. In this case, we will publish customization specs for the mfgs. This will reduce the data required in the ROM. Instead of sending a 4 byte id as now, the mfg would send a 50 byte customization record. The screen manager comprises the table correlating the remote keys to the screen functions. The timing can be a little different on the I2C bus from mfg to mfg; we can use the mfg id to adjust for timing differences at the start of the download of a customization record.

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Art and Sean on hardware: The original VG was a board consisting of a gate array that assumed all the control functions for access by the processor (Motorola 68000), control of memory (dynamic RAM and external ROM), and some peripheral functions such as IR input and output, frequency synthesizer for the paging system, and data acquisition from the paging system. Inside there is a module for an creating an on screen display including a programmable DMA (direct memory access) controller, a color lookup table so that a field called a color index can select a more complicated color (more bits than can be expressed in the bit map), first-in-first-out memory for ordering the pixels so that we can write them as fast as we can and they come out in a prescribed timing on the display. In the chip is a timing subsystem that produces a number of different timing signals of varing frequency--from clocks to long millisecond time measurement and interrupts. Synchronization signals for the tv monitor are also generated by

the internal timing subsystem. Other circuits: data receiver, memory controller, timing interface with the processor, data deinterleaving circuit, error correcting circuit, and synch timing generator with horizontal and vertical counters.

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Display processor: video section and a FIFO section in an ASIC. VG has a single clock; but Pegasus has multiple clocks. 8 tiles in a horizontal plane. The is a separate color map for each tile. You can load in 4 bits that represent 16 colors. You can load in different color sets into the table for each tile so the screen as a whole can display 212 colors. There is a bit map that specifies how many bytes (pixels) there are of each color as a scan line is drawn. The pitch is defined as the number of pixels in a line so you know when the next line starts by comparing the pixel position with the pitch. In a small number of bytes we can get large variety of different display types by varing widths, starting positions, pitches, and color maps. In the next tile you can load a new set of colors. The color table is divided up into palettes consisting of 4 bites per pixel. If a tile has fewer than 16 colors it requires fewer bits to define the colors and memory can be saved. The color bits from the color table go as an index to the look up table (color map) that contains the 4096 possible colors. Each 4 color bits is a palette, to change the colors you only have to say use palette 1 or palette 2.

31304/LTR/V155

Day Three 7/16/97
Tape #7
Sean O'Neil:

Display list hardware to do both video input and output on the same DMA hardware engine may be patentable.

LTR/amh
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